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(54) **METHODS AND SYSTEMS FOR ALTERING SETTINGS OR PERFORMING AN ACTION BY A USER DEVICE BASED ON DETECTING OR AUTHENTICATING A USER OF THE USER DEVICE**

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G06F 9/00	(2006.01)
G06F 21/31	(2013.01)
G06F 9/445	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 21/31*** (2013.01); ***G06F 9/4451*** (2013.01); ***G06F 21/316*** (2013.01)

(58) **Field of Classification Search**

USPC 713/100

See application file for complete search history.

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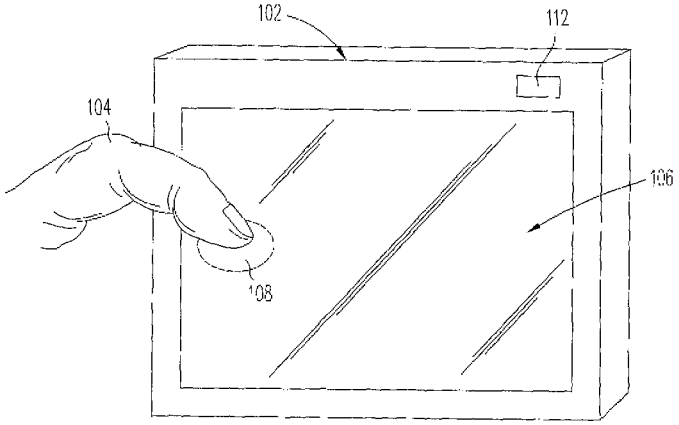
(57) **ABSTRACT**

Systems and methods according to one or more embodiments are provided for detecting or recognizing a user and intelligently altering or adjusting user device settings appropriate for the detected user. In an embodiment, a method comprises detecting, electronically by a processor, a first user interacting with a user device via a user input interface of the user device; determining, electronically by the processor, one or more characteristics associated with a primary user of the user device; determining, electronically by the processor, the first user is not the primary user based at least in part on comparing interactions of the first user with the user device and the one or more characteristics associated with the primary user of the user device; and altering one or more settings of the user device.

20 Claims, 3 Drawing Sheets



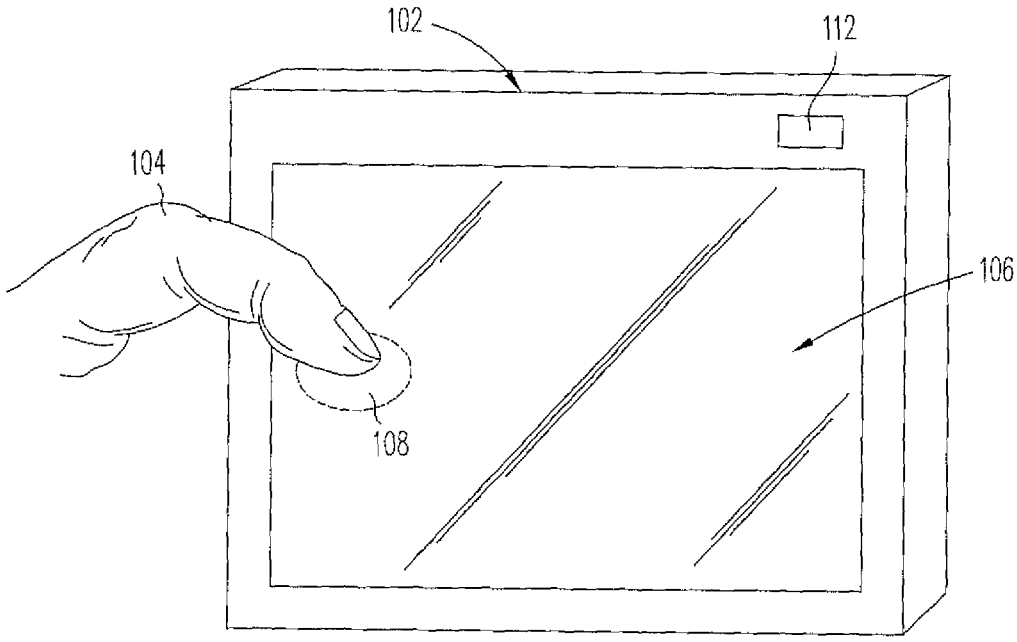

102
112
104
106
108

FIG. 1

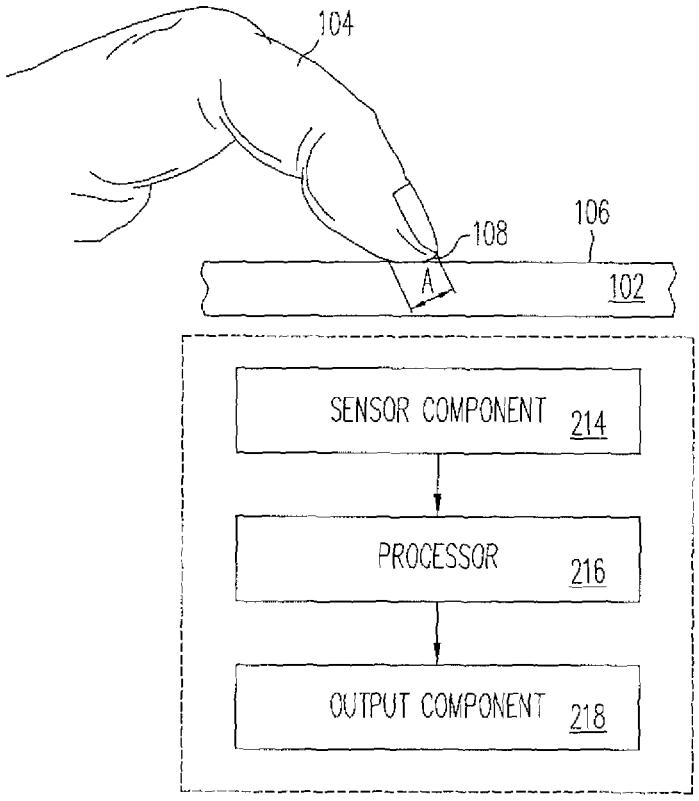

104
108
106
A
102
SENSOR COMPONENT 214
PROCESSOR 216
OUTPUT COMPONENT 218

FIG. 2

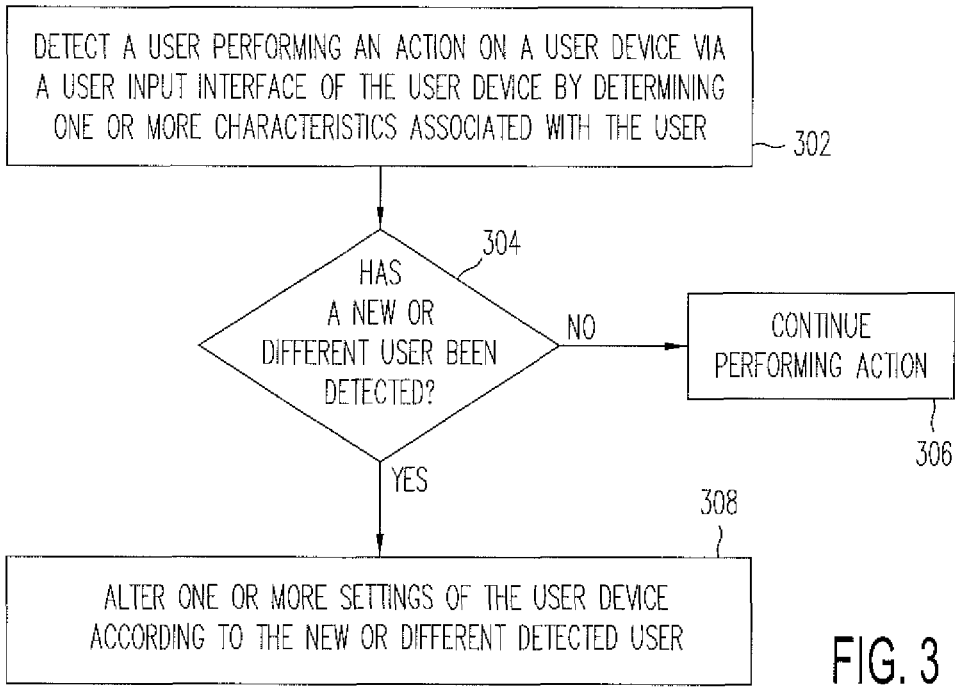

DETECT A USER PERFORMING AN ACTION ON A USER DEVICE VIA A USER INPUT INTERFACE OF THE USER DEVICE BY DETERMINING ONE OR MORE CHARACTERISTICS ASSOCIATED WITH THE USER
302
304
HAS A NEW OR DIFFERENT USER BEEN DETECTED?
NO
CONTINUE PERFORMING ACTION
306
YES
308
ALTER ONE OR MORE SETTINGS OF THE USER DEVICE ACCORDING TO THE NEW OR DIFFERENT DETECTED USER

FIG. 3

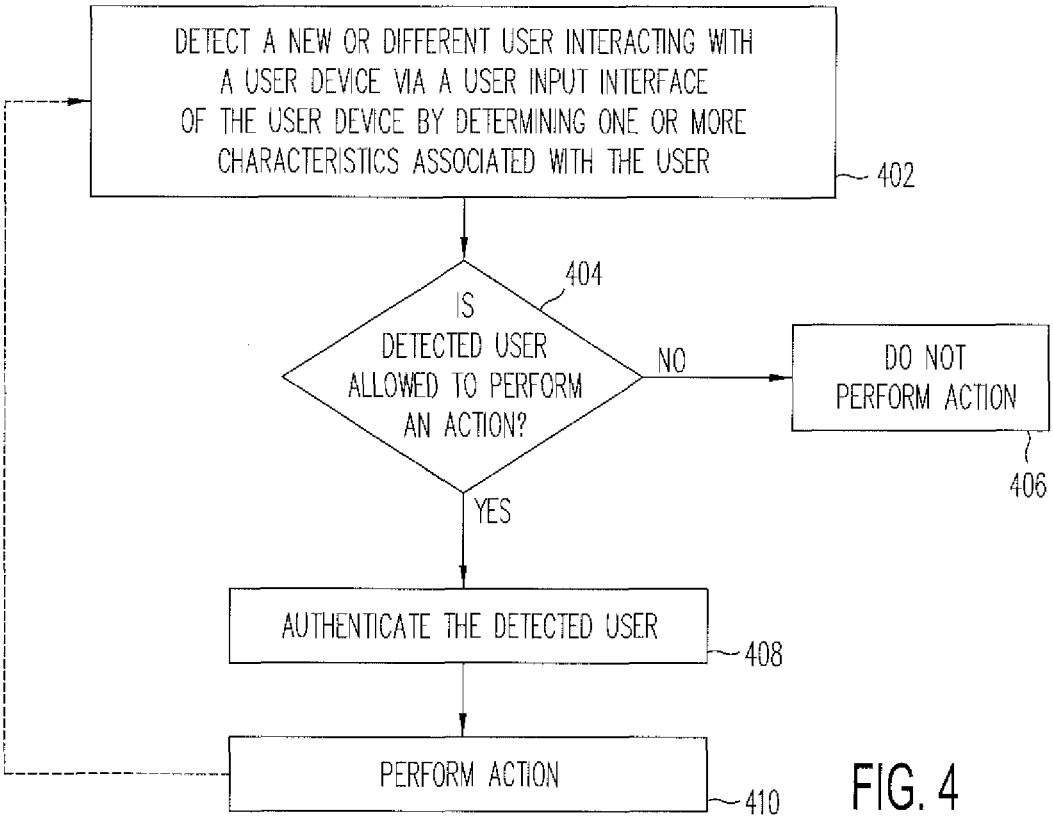

DETECT A NEW OR DIFFERENT USER INTERACTING WITH A USER DEVICE VIA A USER INPUT INTERFACE OF THE USER DEVICE BY DETERMINING ONE OR MORE CHARACTERISTICS ASSOCIATED WITH THE USER
402
404
IS DETECTED USER ALLOWED TO PERFORM AN ACTION?
NO
DO NOT PERFORM ACTION
406
YES
AUTHENTICATE THE DETECTED USER
408
PERFORM ACTION
410

FIG. 4

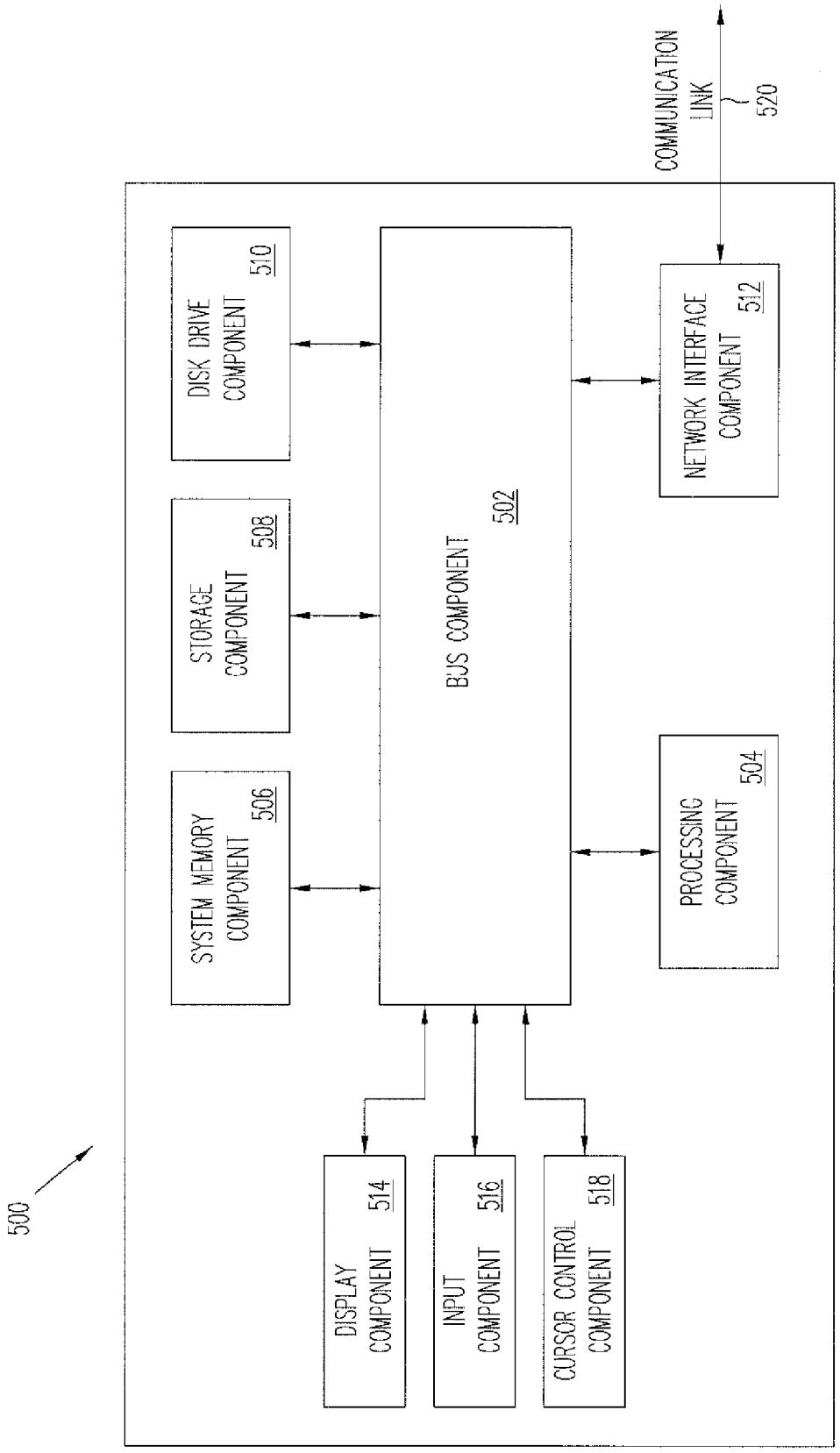

500
COMMUNICATION LINK
520
DISK DRIVE COMPONENT
510
STORAGE COMPONENT
508
SYSTEM MEMORY COMPONENT
506
BUS COMPONENT
502
NETWORK INTERFACE COMPONENT
512
PROCESSING COMPONENT
504
DISPLAY COMPONENT
514
INPUT COMPONENT
516
CURSOR CONTROL COMPONENT
518

FIG. 5

METHODS AND SYSTEMS FOR ALTERING SETTINGS OR PERFORMING AN ACTION BY A USER DEVICE BASED ON DETECTING OR AUTHENTICATING A USER OF THE USER DEVICE

BACKGROUND

1. Technical Field

Embodiments of the present disclosure generally relate to detecting a user and intelligently altering user device settings.

2. Related Art

Currently, user devices such as smart phones, tablets, laptops, etc., may provide users with the ability to perform many different actions such as accessing many types of content, conducting transactions such as purchases, bidding, etc. However, some actions such as accessing certain types of content may be inappropriate for some users such as children or minors. In such cases, while parents may try to supervise and limit the types of actions children may perform on their user devices, for example, limit the content their children can access, children may still be able to perform such actions. For example, children may still be able to access inappropriate content by accident or without the parents' knowledge.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram illustrating an object touching a user input interface of a user device according to an embodiment of the present disclosure.

FIG. **2** is a diagram illustrating components of a user device that may detect a user and intelligently alter user device settings according to an embodiment of the present disclosure.

FIG. **3** is a flow diagram illustrating a method for detecting a user and adjusting user device settings according to an embodiment of the present disclosure.

FIG. **4** is a flow diagram illustrating a method for detecting a user and authenticating the user according to an embodiment of the present disclosure.

FIG. **5** is a block diagram of a system suitable for implementing one or more embodiments of the present disclosure.

Like reference numerals are used to identify like elements illustrated in one or more of the figures, wherein showings therein are for purposes of illustrating embodiments of the present disclosure and not for purposes of limiting the same.

Embodiments of the disclosure and their advantages are best understood by referring to the detailed description that follows.

DETAILED DESCRIPTION

The following description sets forth specific details describing certain embodiments. It should be apparent to a person of skill in the art, however, that the embodiments described herein may be practiced without some or all of these specific details. The embodiments described herein are for illustrative purposes and are not meant to be limiting. A person of skill in the art may realize other material that, although not specifically described herein, is within the scope and spirit of the present disclosure.

According to one or more embodiments of the present disclosure, a user may interact with a user device via a user input interface such as a touch screen. The user device may

determine certain characteristics of a user that is using the user device. In this regard, the user device may detect when a new or different user has begun using the user device. As a result, user device setting such as security settings may be altered or adjusted according to the new or different detected user.

In various embodiments, the user device may detect new or different users by determining or analyzing certain characteristics of a new or different user including, for example, determining the size of an object such as a user's extremity (e.g., the user's finger) that is performing actions on the user device, pressure patterns, applications in use, facial or voice recognition, etc. For example, the user device may detect whether the user is an adult or a child, or that a child has begun using a parent's user device. In that regard, small touch points or small area traces on the user input interface may indicate that a child is using the device while larger touch points or larger area traces may indicate that an adult is using the device.

Once the user device detects that a new or different user is using the user device by determining characteristics of the new or different user that may correspond to certain types of users, for example, a small finger of a child versus a larger finger of an adult, then one or more settings of the user device may be changed or adjusted automatically. That is, if the user device detects that a new or different user is using the user device, this triggers the user device setting changes. In this regard, the user device settings may be changed or adjusted in a way that is appropriate for the new or different user. For example, security settings may be adjusted so that content may be restricted or only certain content may be displayed on the user device if it is determined that a child is using the user device. Or, in some embodiments, different authentication may be required depending on the detected user. For example, one result of a change of a security setting may be that the user needs to be re-authenticated before certain actions are performed such as conducting transactions, e.g., before purchases can be made.

According to one or more embodiments, an application may be downloaded on a user device. The application, as described above, may detect a new or different user of the user device, and as a result, intelligently alter or adjust settings according to the user using the user device. Results of a setting adjustment may include, for example, adjusting the settings in a different way if the user device detects that a user other than a primary user (e.g., the owner of the user device) such as a child has begun using the user device, re-authenticating the user before performing certain actions on the user device, or any other appropriate setting changes depending on the detected user. The application may be provided by a remote location server such as a payment provider server, e.g., PayPal®, Inc., or eBay®, Inc. of San Jose, Calif., USA. In other embodiments, the application may be provided by a merchant server, a financial institution server, or any other appropriate entity server.

Referring now to the drawings wherein the showings are for purposes of illustrating embodiments of the present disclosure only, and not for purposes of limiting the same, FIG. **1** is a diagram illustrating an object touching a user input interface of a user device according to an embodiment of the present disclosure.

FIG. **1** illustrates a user device **102** that includes a user input interface **106** such as a touch sensitive screen, which a user may use to interact with user device **102**. As illustrated in the embodiment of FIG. **1**, the user may interact with user device **102** by contacting (e.g., touching, pressing, pinching, tapping, swiping, etc.) a portion or an area **108** of user input

interface **106** with an object **104** such as a finger. In various embodiments, object **104** may be a hand, different fingers, another extremity of the user, or any other appropriate object associated with the user.

In one or more embodiments, user device **102** may include a user capturing component **112**, for example, a front-facing camera, an audio or voice recognition device, a gesture recognition component, or any other device that may aid in user recognition or identification. User capturing component **112** may capture user identification data such as an image, voice, gestures, etc. of a user that is using user device **102**. In some embodiments, user gestures captured by capturing component **112** may be associated with a user's specific key, password, secret code etc. that is only known or is specific to the user. The user device **102** may then process and use the user identification data according to one or more embodiments as will be described herein.

User device **102** may be implemented using any appropriate combination of hardware and/or software configured for wired and/or wireless communication over a network. For example, in one embodiment, user device **102** may be implemented as a mobile device of a user in communication with a network such as the Internet or another network. In other embodiments, user device **102** may be implemented as a tablet, a personal computer, a wireless telephone, a smart phone, a personal digital assistant (PDA), a key fob, a smart card, a notebook computer, a game console, a digital video recorder (DVR), and/or other types of computing devices or network devices. Furthermore, user device **102** may be enabled for NFC, Bluetooth, online, infrared communications and/or other types of communications.

User device **102** may include one or more processors coupled to one or more memories configured to process downloading, installing and/or running of applications from one or more remote location servers. User device **102** may include various applications as may be desired in particular embodiments to provide desired features to user device **102**. For example, in various embodiments, applications may include security applications for implementing client-side security features, programmatic client applications for interfacing with appropriate application programming interfaces (APIs) over a network, or other types of applications.

User device **102** may further include one or more user identifiers, which may be implemented, for example, as operating system registry entries, cookies associated with a browser application, identifiers associated with hardware of user device **102**, or other appropriate identifiers. In one embodiment, a user identifier may be used by a remote location server to associate user device **102** (or correspondingly a user) with a particular account maintained by the remote location server.

User device **102** may include one or more processors, memories, and other appropriate components for executing instructions such as program code and/or data stored on one or more computer readable mediums to implement the various applications, data, and methods described herein. For example, such instructions may be stored in one or more computer readable mediums such as memories or data storage devices internal and/or external to various components of the system, and/or accessible over a network, which may be implemented as a single network or a combination of multiple networks. For example, in various embodiments, a network may include the Internet or one or more intranets, landline networks, wireless networks, and/or other appropriate types of networks.

Referring now to FIG. **2**, a diagram illustrates components of a user device that may detect a user and intelligently alter user device settings according to an embodiment of the present disclosure. The user device components illustrated in FIG. **2** may be included in user device **102** illustrated in FIG. **1** according to an embodiment.

In the embodiment of FIG. **2**, an object **104** such as a fingertip of a user may be used to interact with a user device **102**, for example, by contacting or touching a portion or an area **108** of a user input interface **106** such as a touch screen of user device **102**. User device **102** may include various components including a sensor component **214**, a processor **216** and an output component **218**.

Sensor component **214** may sense a signal generated in response to an input such as a contact (i.e., pressing, touching, pinching, tapping, swiping, etc.) by object **104** on user input interface **106**. For example, the device may determine an object's size, e.g., a fingertip size that corresponds to contact area **108**, to figure out whether an adult (i.e., large-fingered user) or a child (i.e., small-fingered user) is using user device **102**. In one example, contact area **108** may have a dimension "A" measured across the contact area, which correlates to the object's size at the point or area of contact. In this case, a small dimension "A", for example, less than about a half an inch, may indicate that the object is small and may belong to a child. A larger dimension "A", for example, half an inch or larger, may indicate that the object may belong to an adult.

In an embodiment, sensor component **214** may include a capacitive sensor. Capacitive sensors and their APIs may generally all express relative capacitance. In that regard, processor **216** may map the relative capacitance to a contact (e.g. pressure) sensed on user input interface **106**. For example, the more pressure sensed may be equivalent to a bigger contact patch (e.g., corresponding to contact area **108**). Generally, capacitive sensors work by directly measuring capacitance between a driven voltage on or near a surface user input interface **106** (e.g., on or near the surface of a touch screen) and the contacting object (e.g. a user's finger). Assuming that objects, for example fingers, have basically the same composition and are about the same distance from the sensor (i.e., touching the screen), the amount of capacitance measured will be proportional to a surface area of the portion of the object (e.g., finger) that is contacting the user input interface (e.g. the touch screen).

In one or more embodiments, it may be possible for modern touch sensors to sense more information about the capacitance beyond just the absence or presence of an object and/or the amount of capacitance. For example, in certain systems such as Android® systems, applications are allowed to read information from touch events including not just a two dimensional (x, y) location of the touch, but also the length of the major and minor axes of an ellipse circumscribing the sensed touch event as well as synthesized information such as "pressure" (not actually pressure in this case, but rather a floating point value that varies with the total area of a sensed touch event). By binning and analyzing different contacts or gestures (e.g., single tap vs. horizontal swipe vs. vertical swipe vs. pinch), it may be possible to compare the touch size profile of a known user to a current user and decide whether they are consistent or not. In embodiments herein, model generation and runtime analysis of touch data or information may be done using well-known and suitable machine learning and pattern-matching techniques such as neural networks. An output component **218** may output a measurement corresponding to the contact sensed (e.g. pressure), or, in other embodiments, to a region, an area, or a radius of a circle or simply an absolute capacitance measurement.

In another embodiment, sensor component **214** may include one or more pressure sensors. Data from the pressure sensors may be used in an analysis, for example by processor **216**, to determine whether a new user is operating the user device. In that regard, one user's pattern of pressure may be distinct from another user's pattern of pressure, for example, in the same way that different users may use different pen pressure when writing. Or, in another example, a child may exert less pressure than an adult when interacting via the user input interface.

While any individual contact on user input interface **106** such as pressure, touch, pinch, tap or swipe by an object may be harder or gentler (and thus produce a larger or smaller contact patch), according to embodiments herein, the user device may run background processes to look for overall patterns to determine contact patch pattern information, for example, to determine average and median contact patch sizes, the largest contact patch, what the overall patterns look like in a multi-touch gesture versus a single finger gesture, etc.

In embodiments where an overall pattern shifts too far, especially, for example after a screen is unlocked, after a period of non-use, etc., a processor such as processor **216** may use this pattern shift as an input to decide whether to require a more rigorous identification check or authentication of the user before allowing certain user actions to take place such as purchases, proceeding with a program, or using certain features.

As such, a user device according to one or more embodiments herein may run background or continuous authentication of a user. Advantageously, a frictionless service may be provided wherein users may not have to constantly be asked for identification or authentication information such as login data, or entering a PIN. Running background authentication of a user by looking for overall patterns that may indicate that the user has not changed, may result in the user not being asked for identification or authentication information such as a password.

In an example where a user device may be used by a parent or a child, the parent may tag individual applications as being for the child's use.

Referring back to FIG. **1**, user device **102** may include a user capturing component **112**. User capturing component **112** may be a camera, an audio or voice recognition device, a gesture recognition device, etc. Data captured by user capturing component **112** may be used to recognize or identify a user using the user device. Such data may be processed by processor **216** (in addition to an input sensed by sensor **214**) to detect the user. For example, if the user device includes a front-facing camera, it may be used to recognize a child or an adult or any particular user such as the owner of the user device.

Referring now to FIG. **3**, a flow diagram illustrates a method for detecting a user and adjusting user device settings according to an embodiment of the present disclosure. The method of FIG. **3** may be implemented by the user device illustrated in FIG. **1** or **2** according to one or more embodiments.

In block **302**, a user interacting via a user input interface with a user device to perform an action may be detected by determining one or more characteristics associated with the user. In that regard, a user may be recognized or identified, for example, to be a child, an adult or a specific user such as the owner of the user device. Characteristics associated with the user interacting with the user device may be determined, including for example, the size of a fingertip of the user contacting the user input interface (e.g., a touch sensitive screen). Such characteristics may indicate the identity of the user, for example, a small fingertip size (e.g., less than about half an inch across), a light pressure on the touch screen, etc. may indicate that the user is a child. A larger fingertip size (e.g., more than about half an inch), a stronger pressure on the touch screen, etc. may indicate that the user is an adult.

In various embodiments, the characteristics associated with the user may be complemented or confirmed by data captured by a user capturing component of the user device, for example a front-facing camera, a voice recognition device, a gesture recognition device, etc. In this regard, in addition to the user device recognizing a user that is performing an action or interacting via a user input interface (e.g., by determining a size of a user's extremity), the user device may also complement or confirm the identity of a user by recognizing an image of the user, the voice of the user, a gesture associated or only known to a particular user, etc.

In block **304**, the system or application may determine whether a new or different user has been detected. As described above according to one or more embodiments, capacitance sensors, resistance sensors, pressure sensors, or any other appropriate type of sensors may sense and compare sensor information associated with particular users. For example, overall patterns for one user may be different than overall patterns for another user. In one instance, different users may have different contact patch sizes compared to average and median contact patch sizes (e.g., a first user may have a large contact patch while a new or different user may have a small contact patch). In another instance, different users may use different contact patterns, for example, one user may normally use multi-fingers on a contact surface (i.e., user input interface) versus another user may normally use a single finger on the contact surface. In this regard, a comparison of sensor data may occur when a shift in overall patterns occur, for example, after a user device restart, after a screen lockout, after a change of application, upon capturing a change of a gesture or an image, after a certain period of time or inactivity (e.g., after 30 minutes, after an hour, etc.), or periodically at certain time intervals (e.g., every 30 minutes, every hour, etc.).

In block **306**, if a new or different user has not been detected, then the user may continue to perform the action on the user device.

In block **308**, if a new of different user has been detected, then one or more settings of the user device may be altered according to the new or different detected user. For example, security settings may be altered or adjusted depending on who is using the user device. In one instance where the new or different detected user is a child using a parent's user device, the user device settings may be adjusted so that only appropriate content is presented, e.g., only "G"-rated content. In another instance where a new or different user is detected, security settings may be changed such that the new user needs to re-authenticate before transactions such as purchases may be made. In an example where the same user device may be used by a parent or a child, the parent may tag individual applications as being for the child's use.

Referring now to FIG. **4**, a flow diagram illustrates a method for authenticating a user according to an embodiment of the present disclosure. The method of FIG. **4** may be implemented by the user device illustrated in FIG. **1** or **2** according to one or more embodiments. Also, in various embodiments, the method of FIG. **4** may be performed after a new or different user has been detected as described above with respect to the embodiment of FIG. **3**.

In block **402**, as described above according to one or more embodiments, a new or different user interacting via a user input interface with a user device may be detected by determining one or more characteristics associated with the user. Upon detecting that a new or different user is using the user device, user device settings may be changed according to the detected user. For example, one result may be a security change wherein the new or different user may need to be authenticated before performing certain actions.

In block **404**, the user device (for example by processor **216** illustrated in the embodiment of FIG. **2**) may determine whether the detected user is allowed to perform an action. A user of a user device may wish to perform one or more different actions as normally conducted on user devices including, for example, accessing certain media (e.g., websites, printed publications, TV shows, movies, etc.), playing a video game, accessing an email account, conducting transactions such as purchases, bidding, etc.

Users that may be allowed to perform an action may be determined based on various factors, for example, the user device may restrict the presentation of certain mature or otherwise inappropriate content to a user that is detected to be a child. In another example, the user device may not allow a user using the user device that is detected to be a child or a user other than the owner of the user device to conduct transactions such as bidding, making purchases (in some examples perhaps over a certain amount, e.g., above $10, $20, etc.), or the like.

In block **406**, if the detected user is not allowed to perform an action, then the action is not performed. For example, a user that is detected to be a child may not be allowed to view certain content, make purchases over $20, etc.

In block **408**, if the detected user is allowed to perform an action, the detected user is authenticated. And in block **410**, the action is performed.

In various embodiments, a detected user that is authenticated may not need to continuously enter identifier data such as a password or PIN when an action is performed. Instead, the user may be automatically authenticated as the process may repeat as indicated by the dotted arrow of FIG. **4**. In some embodiments, automatic authentication of a detected user may be set to be performed at regular time periods, for example, every 15 minutes, 30 minutes, etc.

In an example where the action performed includes streaming content to a user that is detected to be an adult, the system may be set to automatically authenticate the detected user to continue performing the action without the user having to enter identifier data. In another example where the action performed includes streaming content to a user that is detected to be an adult, but then at the next authentication period the user is detected to be a child for whom the streaming content may be inappropriate, the action may be automatically stopped. In further embodiments, different authentication may be required depending on the detected user. For example, one detected user may be authenticated and allowed to perform certain actions such as making purchases over a certain amount (e.g., over $500), while another detected user (adult or child) may be required to be authenticated (e.g. recognized or required to enter identifier data) to make purchases over a certain amount, or may even be barred from making purchases at all.

A specific object used by a user may have specific contact characteristics on a user input interface, for example, pressure, touch, tap or swipe by the object may be harder or gentler (and thus produce a larger or smaller contact patch). In embodiments herein, the user device may run background processes to look for overall patterns to determine contact patch pattern information, for example, to determine average and median contact patch sizes, the largest contact patch, what the overall patterns look like in a multi-touch gesture versus a single finger gesture, etc.

In embodiments where an overall pattern shifts too far, especially, for example after a screen is unlocked, after a period of non-use, etc., a processor may use this pattern shift as an input to decide whether to require a more rigorous identification check or authentication of the user before allowing certain user actions to take place such as purchases, proceeding with a program, or using certain features. Advantageously, the user device may process or run background or continuous authentication of a user based on the overall patterns.

In various embodiments, the system may detect a "different" user even when that same user is the one who is first detected using the device in the session. That is, the system may detect that a user that first started using the user device is not the primary user (e.g., the owner of the user device) and alter the user device settings accordingly. For example, a child may have accessed a parent's device, such as by entering the device lock code, or simply through using an unprotected (e.g., no lock screen or passcode) device. In that case, the system may determine, such as described above, that the user is not the one associated with or the primary user of the device or that the user is only limited to certain content as specified by the primary device user.

Referring now to FIG. **5**, a block diagram of a system **500** is illustrated suitable for implementing embodiments of the present disclosure, including user device **102** and a remote location server or device. System **500**, such as part of a cell phone, a smart phone, a tablet, a personal computer and/or a network server, includes a bus **502** or other communication mechanism for communicating information, which interconnects subsystems and components, including one or more of a processing component **504** (e.g., processor, microcontroller, digital signal processor (DSP), etc.), a system memory component **506** (e.g., RAM), a static storage component **508** (e.g., ROM), a network interface component **512**, a display component **514** (or alternatively, an interface to an external display), an input component **516** (e.g., keypad, keyboard, touchpad, voice input, etc.), and a cursor control component **518** (e.g., a mouse pad).

In accordance with embodiments of the present disclosure, system **500** performs specific operations by processor **504** executing one or more sequences of one or more instructions contained in system memory component **506**. Such instructions may be read into system memory component **506** from another computer readable medium, such as static storage component **508**. These may include instructions to detect users of user devices, authenticate users and/or alter or adjust settings, process financial transactions, make payments, etc. In other embodiments, hard-wired circuitry may be used in place of or in combination with software instructions for implementation of one or more embodiments of the disclosure.

Logic may be encoded in a computer readable medium, which may refer to any medium that participates in providing instructions to processor **504** for execution. Such a medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. In various implementations, volatile media includes dynamic memory, such as system memory component **506**, and transmission media includes coaxial cables, copper wire, and fiber optics, including wires that comprise bus **502**. Memory may be used to store visual representations of the different options for searching, auto-synchronizing, making

payments or conducting financial transactions. In one example, transmission media may take the form of acoustic or light waves, such as those generated during radio wave and infrared data communications. Some common forms of computer readable media include, for example, RAM, PROM, EPROM, FLASH-EPROM, any other memory chip or cartridge, carrier wave, or any other medium from which a computer is adapted to read.

In various embodiments of the disclosure, execution of instruction sequences to practice the disclosure may be performed by system **500**. In various other embodiments, a plurality of systems **500** coupled by communication link **520** (e.g., network **160** of FIG. **1**, LAN, WLAN, PTSN, or various other wired or wireless networks) may perform instruction sequences to practice the disclosure in coordination with one another. Computer system **500** may transmit and receive messages, data, information and instructions, including one or more programs (i.e., application code) through communication link **520** and communication interface **512**. Received program code may be executed by processor **504** as received and/or stored in disk drive component **510** or some other non-volatile storage component for execution.

In view of the present disclosure, it will be appreciated that various methods and systems have been described according to one or more embodiments for detecting a user using a user device and intelligently altering user device settings.

Although various components and steps have been described herein as being associated with user device **102** of FIGS. **1** and **2**, it is contemplated that the various aspects of such device illustrated in FIGS. **1** and **2** may be distributed among a plurality of servers, devices, and/or other entities.

Where applicable, various embodiments provided by the present disclosure may be implemented using hardware, software, or combinations of hardware and software. Also where applicable, the various hardware components and/or software components set forth herein may be combined into composite components comprising software, hardware, and/or both without departing from the spirit of the present disclosure. Where applicable, the various hardware components and/or software components set forth herein may be separated into sub-components comprising software, hardware, or both without departing from the spirit of the present disclosure. In addition, where applicable, it is contemplated that software components may be implemented as hardware components, and vice-versa.

Software in accordance with the present disclosure, such as program code and/or data, may be stored on one or more computer readable mediums. It is also contemplated that software identified herein may be implemented using one or more general purpose or specific purpose computers and/or computer systems, networked and/or otherwise. Where applicable, the ordering of various steps described herein may be changed, combined into composite steps, and/or separated into sub-steps to provide features described herein.

The foregoing disclosure is not intended to limit the present disclosure to the precise forms or particular fields of use disclosed. It is contemplated that various alternate embodiments and/or modifications to the present disclosure, whether explicitly described or implied herein, are possible in light of the disclosure. For example, although certain user actions have been described according to one or more embodiments, it should be understood that the present disclosure may also apply to other user actions where requests for information, requests for access, or requests to perform certain transactions may be involved.

Having thus described embodiments of the disclosure, persons of ordinary skill in the art will recognize that changes may be made in form and detail without departing from the scope of the disclosure. Thus the disclosure is limited only by the claims.

What is claimed is:

1. A system comprising:

a non-transitory memory; and

one or more hardware processors coupled to the non-transitory memory and configured to read instructions from the non-transitory memory to cause the system to perform operations comprising:

in response to a finger of a first user touching a display area of a touchscreen of a user device at a first time while the first user is using the user device in an unlocked state, receiving a first capacitive sensor signal generated by a capacitive sensor of the touchscreen and a first pressure sensor signal generated by a pressure sensor of the touchscreen;

in response to the receiving of the first capacitive sensor signal, determining a first fingertip contact size pattern associated with the finger of the first user;

in response to the receiving of the first pressure sensor signal, determining a first pressure pattern associated with the finger of the first user;

in response to a finger of a second user touching the display area of the touchscreen of the user device at a second time while the second user is using the user device in the unlocked state, receiving a second capacitive sensor signal generated by the capacitive sensor of the touchscreen and a second pressure sensor signal generated by the pressure sensor of the touchscreen;

in response to the receiving of the second capacitive sensor signal as a result of the second user touching the display area of the touchscreen, determining a second fingertip contact size pattern associated with the finger of the second user;

in response to the receiving of the second pressure sensor signal, determining a second pressure pattern associated with the finger of the second user;

detecting a pattern shift from the first fingertip contact size pattern and the first pressure pattern at the first time to the second fingertip contact size pattern and the second pressure pattern at the second time; and

in response to the detecting, altering one or more settings of the user device.

2. The system of claim **1**, wherein the operations further comprise:

determining whether the second user is a child by analyzing the second fingertip contact size pattern and the second pressure pattern associated with the finger of the second user,

wherein the altering is performed automatically in response to determining the second user is a child.

3. The system of claim **1**, wherein the detecting of the pattern shift is performed as a background process.

4. The system of claim **1**, wherein the altering of the one or more settings comprises restricting access to one or more applications or one or more types of content.

5. The system of claim **1**, wherein the altering of the one or more settings comprises restricting the second user from making purchases using the user device.

6. The system of claim 1, wherein the operations further comprise:

comparing the second fingertip contact size pattern and the second pressure pattern associated with the finger of the second user with a stored fingertip contact size pattern and a stored pressure pattern associated with a finger of a primary user; and

determining whether the second user is the primary user based on the comparing,

wherein the altering is performed automatically in response to determining the second user is not the primary user.

7. The system of claim 1, wherein the operations further comprise:

in response to the finger of the second user touching the display area of the touchscreen of the user device, receiving an image of the second user captured by a front-facing camera of the user device,

wherein the altering of the one or more settings is based, at least in part, on the image of the second user.

8. A method comprising:

in response to a finger of a first user contacting a display area of a touchscreen of a user device at a first time while the first user is interacting with the user device in an unlocked state, receiving, by one or more processors, a first capacitive sensor signal generated by a capacitive sensor of the touchscreen and a first pressure sensor signal generated by a pressure sensor of the touchscreen;

in response to the receiving of the first capacitive sensor signal, determining, by the one or more processors, a first fingertip contact size associated with the finger of the first user;

in response to the receiving of the first pressure sensor signal, determining, by the one or more processors, a first pressure associated with the finger of the first user;

in response to a finger of a second user contacting the display area of the touchscreen of the user device at a second time while the second user is interacting with the user device in the unlocked state, receiving, by the one or more processors, a second capacitive sensor signal generated by the capacitive sensor of the touchscreen and a second pressure sensor signal generated by the pressure sensor of the touchscreen;

in response to the receiving of the second capacitive sensor signal as a result of the second user contacting the display area of the touchscreen, determining, by the one or more processors, a second fingertip contact size associated with the finger of the second user;

in response to the receiving of the second pressure sensor signal, determining, by the one or more processors, a second pressure associated with the finger of the second user;

detecting, by the one or more processors, a shift from the first fingertip contact size and the first pressure at the first time to the second fingertip contact size and the second pressure at the second time; and

altering one or more settings of the user device based on the detecting.

9. The method of claim 8, further comprising:

determining, by the one or more processors, whether the second user is a child by analyzing the second fingertip contact size and the second pressure associated with the finger of the second user,

wherein the altering is performed automatically in response to determining the second user is a child.

10. The method of claim 8, wherein the detecting of the shift is performed as a background process.

11. The method of claim 8, wherein the altering of the one or more settings comprises restricting access to one or more applications or one or more types of content.

12. The method of claim 8, wherein the altering of the one or more settings comprises restricting the second user from making purchases using the user device.

13. The method of claim 8, further comprising:

accessing, by the one or more processors, a fingertip contact size and a pressure associated with a finger of a primary user of the user device stored in a memory;

comparing, by the one or more processors, the second fingertip contact size and the second pressure associated with the finger of the second user with the stored fingertip contact size and the stored pressure associated with the finger of the primary user; and

determining, by the one or more processors, whether the second user is the primary user based on the comparing,

wherein the altering is performed automatically in response to determining the second user is not the primary user.

14. The method of claim 8, further comprising:

in response to the finger of the second user contacting the display area of the touchscreen of the user device, receiving, electronically by the one or more processors, an image of the second user captured by a front-facing camera of the user device,

wherein the altering of the one or more settings is further based on the image of the second user.

15. A non-transitory machine-readable medium having stored thereon machine-readable instructions executable to cause a machine to perform operations comprising:

in response to a finger of a first user contacting a display area of a touchscreen of a user device at a first time while the first user is using the user device in an unlocked state, receiving first capacitive sensor data generated by a capacitive sensor of the touchscreen and first pressure sensor data generated by a pressure sensor of the touchscreen;

in response to the receiving of the first capacitive sensor data, determining a first fingertip contact pattern associated with the finger of the first user;

in response to the receiving of the first pressure sensor data, determining a first pressure pattern associated with the finger of the first user;

in response to a finger of a second user contacting the display area of the touchscreen of the user device at a second time while the second user is using the user device in the unlocked state, receiving second capacitive sensor data generated by the capacitive sensor of the touchscreen and second pressure sensor data generated by the pressure sensor of the touchscreen;

in response to the receiving of the second capacitive sensor data as a result of the second user contacting the display area of the touchscreen, determining a second fingertip contact pattern associated with the finger of the second user;

in response to the receiving of the second pressure sensor data, determining a second pressure pattern associated with the finger of the second user;

detecting a change in pattern from the first fingertip contact pattern and the first pressure pattern at the first time to the second fingertip contact pattern and the second pressure pattern at the second time; and

altering one or more settings of the user device based on the detecting.

16. The non-transitory machine-readable medium of claim 15, wherein the operations further comprise:

determining whether the second user is a child by analyzing the second fingertip contact pattern and the second pressure pattern associated with the finger of the second user,

wherein the altering is performed automatically in response to determining the second user is a child.

17. The non-transitory machine-readable medium of claim 15, wherein the detecting of the pattern shift is performed continuously or at regular time intervals as a background process.

18. The non-transitory machine-readable medium of claim 15, wherein the altering of the one or more settings comprises restricting access to one or more applications or one or more types of content.

19. The non-transitory machine-readable medium of claim 15, wherein the altering of the one or more settings comprises restricting the second user from making purchases using the user device.

20. The non-transitory machine-readable medium of claim 15, wherein the operations further comprise:

accessing a fingertip contact pattern and a pressure pattern associated with a finger of a primary user of the user device stored in a memory;

comparing the second fingertip contact pattern and the second pressure pattern associated with the finger of the second user with the stored fingertip contact pattern and the stored pressure pattern associated with the finger of the primary user; and

determining whether the second user is the primary user based on the comparing,

wherein the altering is performed automatically in response to determining the second user is not the primary user.

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